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by

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Abstract

Recent literature suggests that a proactive exchange rate policy in accordance with price incentives (i.e. undervaluation) can foster manufactured exports and growth. This paper is built on these recent developments and investigates, using a sample of 52 developing countries, whether such a proactive exchange rate policy is adopted. The results show that during the period 1991-2005 a number of countries has used undervaluation to foster the price competitiveness of manufactured exports.

Key Words: Exchange rate, Misalignment, Undervaluation, Exports diversification

JEL Classification: O14, O24, O53

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1. Introduction

The shift of resources from the primary to the secondary sector has been recognized as a driver of the development process. Most of the "pioneers" of the development economics from Lewis (1954) or Nurkse (1954) to Chenery (1986) have supported this view. Several theoretical arguments underlie the need of stimulating manufacturing sector, especially through the increase of its exports, in the context of the global economy. First, the demand for manufactured goods increases more with income than the demand for primary products. Hence, growth prospects for a country's exports are higher through specializing in manufacturing (Page, 2011 and Hausmann et al., 2007). Second, the development of the manufacturing sector induces substantial dynamic productivity gains, and consequently growth, arising from economies of scale, learning effects, and externalities among firms and industries (Hirschman, 1958; Seers, 1964 and Matsuyama, 1992). Third, with relatively higher price elasticities of both demand and supply, the economies are less susceptible to price swings (Elbadawi, 2001). Although not directly addressing the validity of such channels, empirical analyses lend support to the role of manufactured exports in fostering growth. In a cross country analysis, Sachs and Warner (1995) found that manufactured exports and economic growth are positively related. Jones and Olken (2008) also relying on cross-country analyses show that growth accelerations and decelerations are associated with employment move into and out of manufacturing. Rodrik (1986, 2007) finds that rapidly growing developing countries tend to have large manufacturing sector. Johnson et al. (2010) argued not only that manufactured exports was successful in many countries as a mode of escaping from underdevelopment but that improvement in the quality of institutions also occurs when growth is driven by manufacturing exports. To ease the attainment of these promising structural objectives, reforms have been launched in many developing countries by the mid-1980s. Trade liberalization, but also exchange rate management on which this paper focuses, were initially at the heart of such reforms.

The economic approaches to exchange rate management have evolved over the past decades. Earlier work dealt with the trade dimension and more specifically analyzed the impact of the removal of relative price distortions penalizing exported goods (e.g. Krueger, 1978 and Balassa, 1982). Starting mid-eighties, a broader approach to exchange rate management emerged. Exchange rate has to be perceived as an instrument to adjust the whole economy to changes in variables affecting a country's long term internal and external equilibrium, the so-called "fundamentals" (see Edwards, 1988**.** In this perspective the new approach questions the former wisdom that an overvaluation could be seen as a potential vehicle for economic growth: the export-oriented agricultural sector being indirectly taxed while the manufactured sector would benefit from cheap imported inputs. Cottani et al. (1990) and Ghura and Grennes (1993) evidenced a negative relation between overvaluation and economic growth. The normative conclusion then emerged that countries should keep their exchange rate as close as possible to the equilibrium level. Rodrik (2008, 2009) recently disputed such a perspective, especially for economies that have to achieve the structural changes we referred to above. He provided theoretical arguments calling for an active disequilibrium exchange rate strategy taking the form of a deliberate undervaluation of the real value of the national currency.

Referring to seven high growth rate countries over the period 1950-2004, Rodrik argued that, just as overvaluation hurts growth, undervaluation facilitates it. More than the non-tradable sector, which may incorporate excess costs in domestic prices; tradable goods particularly suffer from domestic institutional weaknesses as well as market failures that remain sometimes prominent in low to middle per capita income countries. Collier (1997) made a similar point asserting that manufacturing being one of the most transaction-intensive activities, high transaction costs due to a poor policy environment might have caused Africa's comparative disadvantage more than *Dutch-disease* phenomena. Freund and Pierola (2008) findings of a surge in manufacturing export following episodes of real exchange rate undervaluation and the above documented relationship between manufactured exports and economic growth provide support to the positive impact of undervaluation. The conclusion then arises in Rodrik (2008)'s paper that a systematic increase of the relative price of tradables acts as a "second-best" solution to partially alleviate relevant distortion and spur economic growth[1]. The author qualifies somewhat this normative prescription in relation with global macroeconomic imbalances that drove to the 2008 financial crisis (see Rodrik, 2010).

The issue of deliberate undervaluation is the subject of many arguments between countries. The most prominent example is the Chinese-European-American controversy about the Renminbi (RMB). China is accused of maintaining the RMB rate below its equilibrium level to favor its exports (see Evenett (2010) for an extensive discussion). Such blame is rejected by the Chinese authorities. To the extent that our sample contains China, the analysis in this paper could shed some light on this controversial debate.

[1] Another way to promote the diversification is to improve productivity more than competitors do. However, improvement of productivity is not an easy target in LDCs. Because increased uncertainty about future profitability pushes domestic producers to limit their investment, which further affects their technological upgrading. Rigidity on the labor markets limits greatly the possibility of rationalizing the use of labor by firms and, hence, improvement in labor productivity.

The objective of this paper is ***not*** to study the relationship between the exchange rate and growth but to investigate whether developing countries are receptive to the spirit of a proactive exchange rate policy in accordance with price incentives for fostering manufactured exports. The first step toward the objective of the paper is to identify countries maintaining undervalued exchange rates. The second step is to examine whether such a strategy has been pursued in order to foster manufactured exports.

In the first step, undervaluation is naturally defined as an observed exchange rate level below its equilibrium level. The latter is not observable. To identify its level, Edwards (1988)'s method is adopted. It consists of separating the evolution of the Real Effective Exchange Rate (REER) into two components reflecting the evolution of the Equilibrium Real Effective Exchange Rate (EREER) and the deviation of the observed REER from the equilibrium (i.e. misalignment), respectively.

In the second step, we will use Granger causality tests to examine whether countries having undervalued exchange rate (Especially if undervaluation is maintained for some time) are doing so with the objective of providing price incentives for fostering manufactured exports. If this is the case, the country will seek to set the exchange rate in order to improve the price competitiveness of manufactured exports. Hence, the changes in the exchange rate will precede and explain changes in the price competitiveness. In econometric terms, this means that the changes in the exchange rate "Granger-cause" the changes in the price competitiveness of manufactured exports.

The analysis is conducted for 52 developing countries over the period 1980-2005. To take advantage of the time series-cross section dimensions of the sample, the econometric analysis is based on the recent developments in the panel-data-co-integration methodology. Section 2 identifies countries having an undervalued exchange rate. Section 3 examines whether these countries are doing so with the objective of providing price incentives for fostering manufactured exports. Section 4 concludes.

2. Undervaluation across time and countries

The first step of our analysis is to identify countries with undervalued exchange rates. To this end, we will compare each country's observed exchange rate with the value it should have under the hypothesis that the macroeconomic equilibrium is to be maintained. The observed exchange rate considered here is the Real Effective Exchange Rate (*REER*), which is the most commonly used in this respect. As for the exchange rate compatible with macroeconomic equilibrium we use a model based on Edwards (1988) which allows computing Equilibrium Real Effective Exchange Rate (*EREER*). A level of the *REER* below the one of the *EREER* is associated with undervaluation.

2.1 The Real Effective Exchange Rate

One major issue with the construction of the *REER* is the debated subject about the appropriate price index. On a long-term basis, we hypothesize that exporters cannot deviate from the "law of one price". Then, our concern is to find an index allowing comparisons of domestic costs of production across countries that may reflect relative long run ability to produce while remaining profitable. The IMF regards the unit labor cost (ULC) in manufacturing as a simple and useful index in this respect. However, if its evolution offers a reliable gauge of the profitability of traded goods, most developing countries lack the data to calculate it.

The Wholesale Price Index (WPI) does not prove to be an appropriate alternative to the ULC. Not only it is also available for few countries, generally industrialized economies, but it under-weighs non-traded goods that condition price competitiveness for traded goods, especially manufactured ones. Therefore, it does not reflect the long run profitability as reallocations may exist in the short run between wages and profits. Accordingly, the Consumption Price Index will be preferred for the construction of the *REER*. This index is available over a long period and incorporates a significant non-traded component. In addition, the CPI tends to be correlated with production costs as salary arrangements generally rely on its evolution. However, one limitation underlying the use of this index is that nominal wages and unit labor costs are supposed to be related in the same way across countries. In other words, the effect of the change in labor productivity on wages is assumed not to differ much across the trading partners incorporated in the calculation of the REER. For a given country, the real exchange rate index comes as follows:

$$Log(REER) = \sum_{j=1}^{j=10}\left[w_j * Log\left(e_j * \left({CPI}/{CPI_j}\right)\right)\right] \quad (1)$$

where:

CPI is the Consumer Price Index of the country;

CPI_j is the Consumer Price Index of the country's partner j;

e_j is the nominal bilateral exchange rate of the country as regard partner j;

w_j is the weight of the j-th partner in the whole bilateral imports of the country.

The weighting pattern refers to the 10 largest trading partners over the period 1999-2003 excluding oil exporting countries (i.e. those for which petroleum related products represent at least 50% of their exports). Weights are calculated by considering the structure of national imports at the end of the period of observations in order to focus on the diagnosis for the most recent years. This choice allows taking into account the increasing contribution of some large emerging countries such as China, India or Brazil in the international trade. Because of its better statistical properties, a geometric rather than an arithmetic mean of the relative prices has been used to compute the *REER* over the period 1980-2005. An increase of the *REER* means an appreciation.

2.2 The Equilibrium Real Effective Exchange Rate

Because of misconceived policies or imperfect functioning of the exchange market, the *REER* may be a poor indicator of the macroeconomic equilibrium of an economy. Misconceived economic policies can maintain exchange rate away from the one corresponding to such equilibrium level. However, a country can also be willing to keep an over evaluated exchange rate in order to reduce the cost of importing machinery and other inputs for domestic firms. The resulting misalignment has been found to be damaging to economic performance (Edwards, 1988 and Cottani et al. 1990) implying that the *REER* should be maintained as close as possible to its equilibrium level (i.e. *EREER*).

Over the last thirty years, the economic literature on the exchange rate has developed in a way that allowed determining the influence of a limited range of variables affecting the long run real value of a currency (e.g. Williamson, 1994; Edwards, 1998). These variables, called the "fundamentals", include external (e.g. the international terms of trade) as well as internal factors (e.g. government expenditure). The impact of these determinants can be estimated through an econometric regression and are used to calculate the *EREER* as well as the potential accompanying misalignment of the actual rate. Practically, the *REER* is decomposed into the

EREER and misalignment. Edwards (1988) was the first to propose an approach that makes it possible to distinguish between the two sources of *REER* variations. The latter is regressed on external and domestic ''fundamentals'', which bring about changes in the *EREER* if sustained over a long time period and do not create misalignment, unless price adjustment is extremely sluggish. In estimating the impact of these factors, we use the following empirical model (Edwards, 1994):

$$\text{Log}\,(REER) = \alpha_0 + \alpha_1\,\text{Log}\,(Open) + \alpha_2\,\text{Log}\,(Cap) + \alpha_3\,\text{Log}\,(ToT) + \alpha_4\,\text{Log}\,(rDebt) + \alpha_5\,\text{Log}\,(Gov) + \alpha_6\,\text{Log}\,(GDPgap) + \alpha_7\,\text{Log}\,(BalSam) + \varepsilon \qquad (2)$$

For clarity, we do not mention the year and country indices. The *REER* is defined in Equation 1, *ToT* is the terms of trade (the ratio of export to import prices); *Open* is the ratio of export plus imports to GDP; *Cap* is the net capital inflow scaled by GDP; *Gov* is government consumption in percentage of the GDP; *rDebt* is the country debt services including interest payments and reimbursements as a share of GDP; *GDPgap* is the difference between the average per capita GDP growth rate within the whole sample and the growth performance of the *BalSam* is the ratio between the country's real per capita GDP and the geometric mean (weighted in a similar way as the exchange rate) of the same variable in the 10 major trading partners.

It is expected that trade openness exerts downward pressures on the relative price of tradable to non-tradable goods, thereby leading to an appreciation in the equilibrium *REER*; α_1 is expected to be negative. Higher capital inflows involve stronger demand for both tradables and non-tradables and lead to a higher relative price of non-tradables and *REER* appreciation. This is needed for domestic resources to be diverted toward production in the non-tradable sector in order to meet increased demand; α_2 is expected to be positive. The rise in the terms of trade is assumed to appreciate the equilibrium *REER* to the extent that it improves the trade balance; the income effect dominating the substitution effect; α_3 might be positive. The higher the country debt services the higher will be the demand for foreign currencies inducing depreciation of exchange rate; α_4 is expected to be negative. Government consumption has a similar effect: stronger demand for non-tradables increases their relative prices leading to an appreciation in the equilibrium *REER*; then we expect a positive sign for α_5. The coefficient of the per capita GDP gap, $\alpha_{6,}$ is supposed to be negative, supporting the idea that a lower economic growth rate means a loss of economic opportunity in comparison with what the other countries do. The variable

BalSam reflects a productivity gap and aims at capturing the potential Balassa-Samuelson effect. Assume the prices for tradable sectors homogeneous across countries and their productivity higher than in non-tradable sectors. The increase in wages in the tradable sectors due to higher productivity spills over the wages in non-tradable sectors. The latter induce an increase in inflation and an appreciation of the *REER*; α_7 is expected to be positive.

2.3 The results

Equation (1) will be used to estimate the *EREER* and potential misalignment on a sample of 52 developing countries from Africa, Asia and Latin America over the period 1980-2005 (See Appendix A)**.** The sample is determined according to the availability of data with the major source of information we used (i.e. the World Development indicators and the International Financial Statistics). As explained above, the *EREER* concerns the long-term relationship between the *REER* and the fundamentals. In order to determine such a relationship, one should, therefore, use the co-integration methodology (Engle and Granger, 1987). The latter allows separating the long and short-term relationships between the *REER* and the fundamentals.

While co-integration analysis has been for a long time applied to "pure" time series (e.g. a given country over time), in this paper we take advantage of the time series and the cross-section dimensions of the sample to study the relationship in Equation (1) using recent developments of panel-data-co-integration analysis. The latter allows for more efficient estimation and testing, especially when the number of time periods is limited (e.g. Levin and Lin, 2002; Im, Pesaran and Chin, 2003; Moon and Perron, 2004; Chang, 2002; Pesaran, 2005; Pedroni 2004 and Kao and Chiang, 1998).

Pooling the data potentially improves the robustness of estimations with misalignments being determined according to a "normal" behavior given by the average estimated coefficients over the sample. However, panel data being vulnerable to the heterogeneity of countries, country fixed effects are introduced in the empirical model. Time fixed effects, which did not prove statistically significant over the period, have been dropped. In order to avoid too much technicality in the main text, the panel-data-co-integration analysis is presented in Appendix B. The resulting long-term relationship between the *REER* and the explanatory variables is given in Table 1. It has a good overall quality of fit and all the coefficients are significant with the expected sign.

Table 1: Panel data estimation results of the REER (1980-2005)

	Equation (2)
Variables	**Coefficients**
Cap	0.00***
	(4.02)
Open	-0.52***
	(14.01)
BalSam	0.38***
	(7.90)
rDebt	-0.11***
	(6.11)
Gov	0.25***
	(6.25)
ToT	0.12***
	(3.31)
GDPgap	-0.01*
	(1.75)
Adjusted-R^2	0.60

Note: Absolute t-statistics are in parentheses. *** = significant at 1%, * = significant at 10%

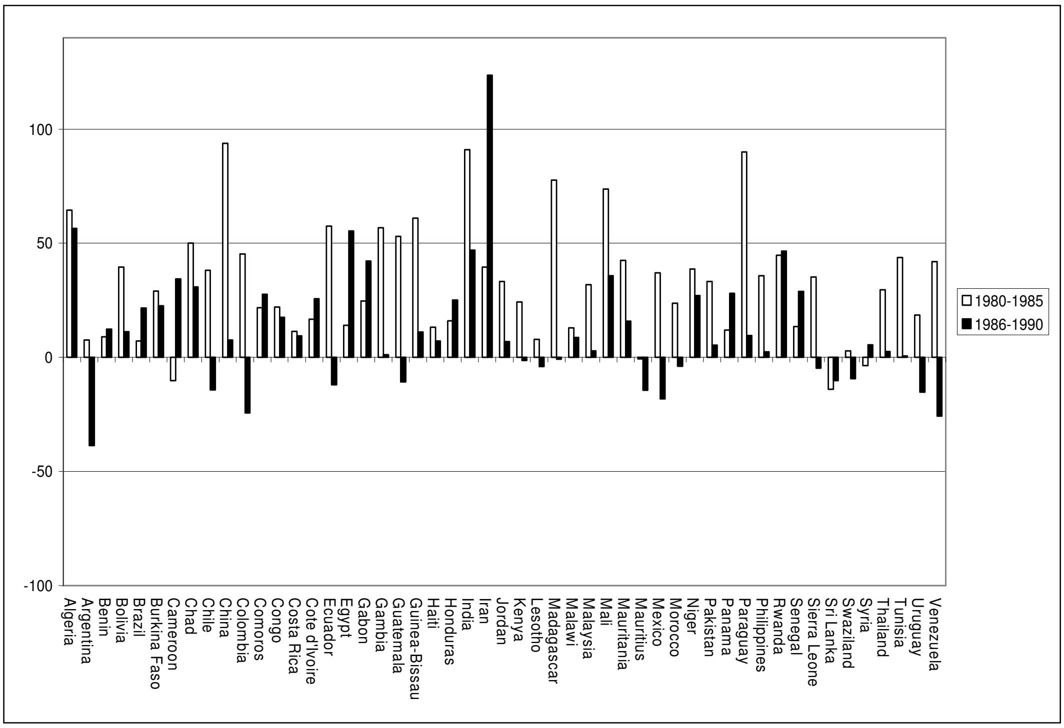
Using the coefficients in Table 1, one can compute the extent of the *REER* misalignment. Recall that misalignment refers to the difference between the *REER* and the *EREER*. The latter is given by the fitted values using together the estimates in Table 1 and the long run values of the explanatory variables. To get such long run values, we use the Hodrik-Precsott filter to separate the permanent and temporary components of each variable. We define misalignment as:

$$Mis = (REER\ /\ EREER - 1) * 100 \qquad (3)$$

The positive values correspond to overvaluations and the negative to undervaluation.

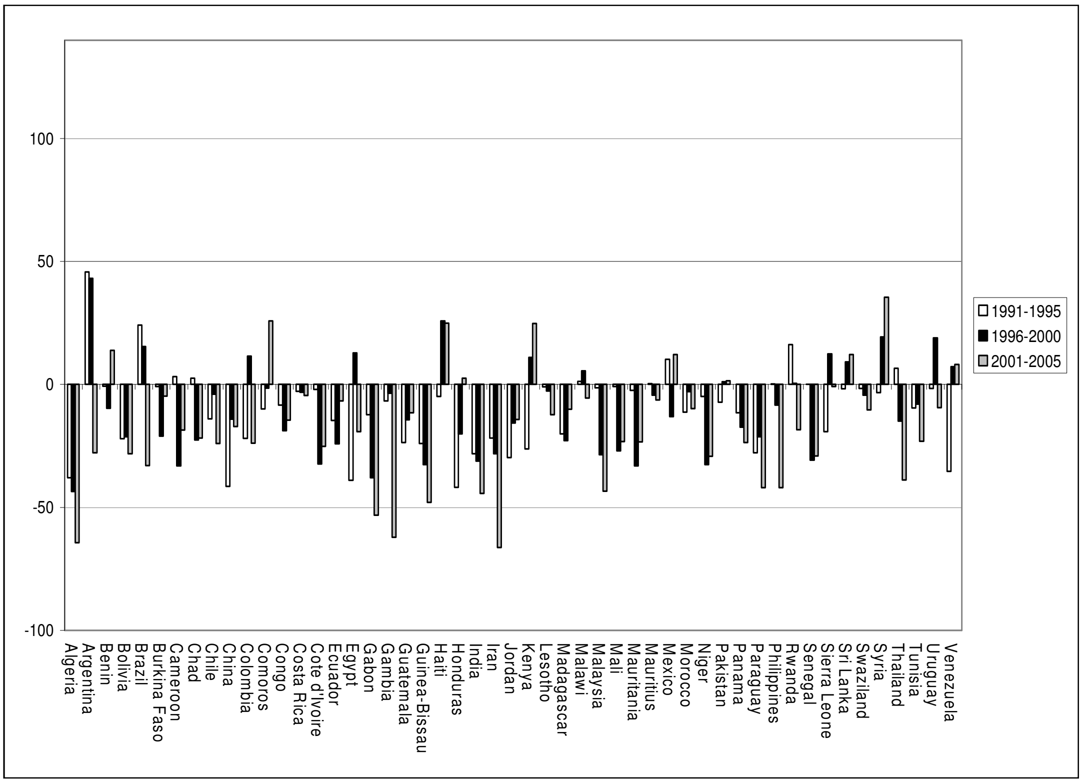
Figures 1 and 2 present, on comparable scales, the extent of the 5 year average exchange rate misalignment during the periods 1980-90 and 1991-2005, respectively. We set the year 1990 as a separator between the two figures in order to highlight possible change in exchange rate management. The 1990s have witnessed an acceleration of exchange rate reforms in many LDCs with the aim of fostering development through manufactured exports expansion. Comparisons over the two sub-periods do not reject the presence of contrasted evolutions. While the 1980-90 period was characterized by exchange rate overvaluation, the period 1991-2005 exhibits a reverse feature. Overvaluation was not only more frequent in the first sub-period but also much higher. In the second sub-period, undervaluation was more frequent and much larger than in the first period.

Figure 1: Exchange rate misalignments: 1980-1990



Note: Due to its high overvaluation in 1980-1985 (more than 200%), Ghana is removed from this figure to ease scale comparison.

Figure 2: Exchange rate misalignments 1991-2005



While exchange rate undervaluation might foster manufactured exports, the literature points to the importance of its persistence. For instance, Hausmann et al. (2005) examining growth episodes (i.e. growth acceleration by at least two percentage points lasting for at least eight years) found that real previous depreciation is among the factors significantly associated with these episodes. An increase of undervaluation by around 10% which is sustained for five years precedes growth episodes. Freund and Pierola (2008) also found a surge in manufacturing exports following episodes of RER undervaluation. To illustrate the persistence dimension, Figure 3 gives the percentage of years during which exchange rate were undervalued during the periods 1980-90 and 1991-2005, respectively. The figure shows that, in general, the percentage of years during which exchange rate were undervalued is higher during the 1991-2005 than during 1980-90. Moreover, this percentage is high during the 1991-2005. It is frequently higher or equal to 70%.

Figure 3: Years (in % of the period) of exchange rate undervaluation

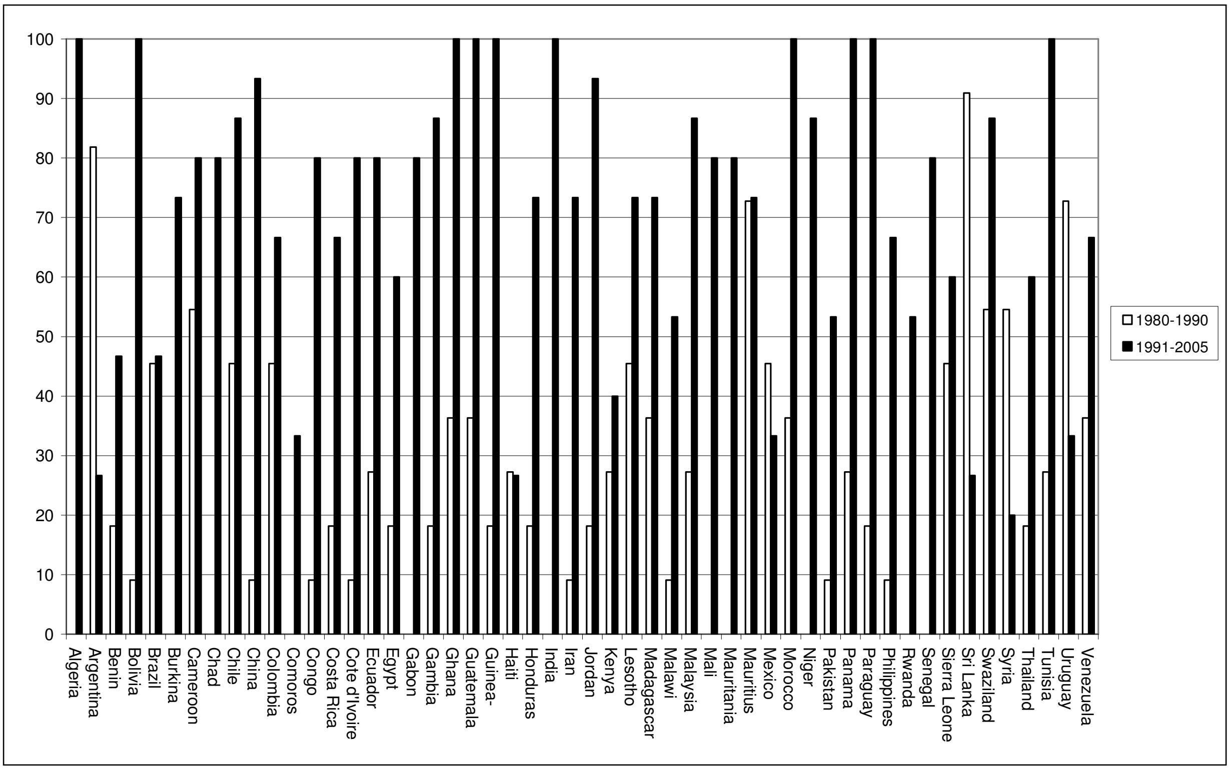


Table 2 focuses on 1991-2005; a period during which undervaluation was the most frequent. It provides further insights on the occurrence of undervaluation and its acuteness by presenting average undervaluation for countries exhibiting such undervaluation and the percentage of years during which exchange rate was undervalued. The Table also gives the estimated standard deviation of misalignment computed using equations 1 and 2, the sample observations and the estimation results in Table 1. Out of the 52 countries in the sample, 41 exhibit an undervalued currency over the period 1991-2005. Among these countries the undervaluation highly differs; ranging from about 65% in Ghana to less than 1% in Rwanda. Except for Ghana and Algeria, no country displays an average undervaluation higher than twice the standard deviation (in absolute term). For 14 countries, including China, the undervaluation is higher than one standard deviation (in absolute term).[2]

As mentioned in the introduction, China is accused of maintaining the RMB rate below its equilibrium level to favor exports. Cheung et al. (2007) conducted an empirical analysis that found little evidence of the RMB undervaluation. Eichengreen (2007) refuted that their findings could be interpreted as a rejection of the RMB undervaluation hypothesis because their empirical strategy (i.e. an extended PPP approach) encounters fundamental problems. In particular, their empirical strategy focuses exclusively on price comparisons and forgets the other dimensions of the macroeconomic equilibrium (Cottani et al., 1990; Ghura and Grennes, 1993 and Razin and Collins, 1997). In the present paper, we adopted a different strategy which addresses such problems.

From Table 2, we also notice that, in all countries, undervaluation during the period 1991-2005 occurred at least in 8 years (half of the period). However, in a majority of countries (26 out of 41) undervaluation occurred during at least 12 years (80% of the period). In 10 countries, undervaluation stayed for the whole period. Finally, among the 14 countries exhibiting an average undervaluation higher than one standard deviation (in absolute term) none shows a percentage lower than 80% (a number of years equal to 12 out of 14) except Iran (73%).

To sum up, the first step of our analysis confirms the existence of countries having undervalued exchange rate during the period 1991-2005. Undervaluation is in some instances both very high and very persistent. Depending on the criteria we use (i.e. duration, level), the number of concerned countries is at least 14 out of 52 in the whole sample (i.e. slightly less than 30%). The second step of our analysis, presented in the next section, focuses on whether countries having

[2] Note that these are average over the period and, hence, undervaluation might be much higher for a given year. This was the case of course for Ghana in 2001 (more than 100%) but also for China in 1994 (almost 60%).

undervalued exchange rate, especially if undervaluation is maintained for some time, have pursued a deliberate strategy aiming at fostering manufactured exports through price incentives.

Table 2: Forty one countries experiencing undervaluation between 1991 and 2005

Country	Average undervaluation	Percentage of years
Algeria	-48.62+	100
Bolivia	-23.84+	100
Burkina Faso	-8.85	73
Cameroon	-16.20	80
Chad	-13.92	80
Chile	-14.01	87
China	-24.25+	93
Colombia	-11.43	67
Congo	-13.93	80
Costa Rica	-3.49	67
Cote d'Ivoire	-19.81	80
Ecuador	-15.16	80
Egypt	-15.15	60
Gabon	-34.49+	80
Gambia	-24.14+	87
Ghana	-64.70+	100
Guatemala	-16.48	100
Guinea-Bissau	-34.90+	100
Honduras	-19.82	73
India	-34.57+	100
Iran	-38.80+	73
Jordan	-19.93+	93
Lesotho	-5.32	73
Madagascar	-17.72	73
Malaysia	-24.45+	87
Mali	-17.00	80
Mauritania	-19.63	80
Mauritius	-3.47	73
Morocco	-8.03	100
Niger	-22.22+	87
Pakistan	-1.58	53
Panama	-17.48	100
Paraguay	-30.32+	100
Philippines	-16.70	67
Rwanda	-0.56	53
Senegal	-19.92+	80
Sierra Leone	-2.53	60
Swaziland	-5.45	87
Thailand	-15.73	60
Tunisia	-13.56	100
Venezuela	-6.69	67
Standard Deviation	19.90	-

Note: + means above standard deviation in absolute term

3. Price incentives for manufactured exports and undervaluation

3.1 The Exports Price Competitiveness Index

Both the *REER* and the *EREER* refer to macroeconomic conditions. However, exchange rate adjustments that respond to macroeconomic conditions do not necessarily meet requirements of microeconomic competitiveness of exporters of manufactured products. Microeconomic competitiveness is defined as the ability of national producers to trade across national boundaries i.e. to have costs of products that do not significantly depart from those of the main international competitors. Assuming that the "law of one price" holds at the 4-digit level of the Standard International Trade Classification (SITC), movements of relative prices, as measured by CPI of exporters, can be interpreted as a proxy of the movements in cost differences across the producers of the individual product. Therefore, such relative prices can be used as an indicator of exports price competitiveness.

The indicator of exports price competitiveness, hereafter denominated *EPCI*, is computed following Goldberg (2004). The first step to build the indicator consists in disaggregating the international trade of each country according to the 4-digit of the SITC. Each 4-digit-SITC item is referred to as a single product for which we compute a separate series of *EPCI*. In the construction of a specific *ECPI*, we take into account the ten largest worldwide exporters of the corresponding product. The weight attributed to each exporter depends on its relative importance among the ten exporters of this product. Hence, for a given year t and a given product p, the indicator of exports price competitiveness denominated $EPCI_{pt}$ is calculated as follows:

$$Log\left(ECPI_{pt}\right)=\sum_{j=1}^{j=10}\left[w_{jp}*Log\left(e_j*\left(CPI/CPI_j\right)\right)\right] \quad (4)$$

where :

CPI is the Consumer Price Index of the country;

CPI_j is the Consumer Price Index of the country's partner j;

e_j is the nominal bilateral exchange rate of the country as regard partner j;

w_{jp} is the weight of the j-th partner in total international trade of the ten most important exporters of product p.   .

The same calculation is replicated as many times as the number of products exported by the country requires, provided that the product represents at least 1% of its average national exports over the period 1999-2003. A weighted average of all $EPCI_{pt}$ can be calculated by country as:

$$Log(ECPI)=\sum_{p=1}^{p=P}\left[q_p *Log(ECPI_{pt})\right] \qquad (5)$$

where q_p is the weight of the p-th good in the country's total exports. A decrease in $ECPI$ means an improvement in the price competitiveness. Countries pursuing active exchange rate policies in the line of what Rodrik (2008, 2009) recommends for developing economies, target such exports price competitiveness in order to provide incentives to domestic producers to export.

To our best knowledge, Goldberg (2004), focusing on the USA, was the first to construct sector-specific indicators of price competitiveness. She found that the period-to-period percentage changes in the indicators and the *REER* could differ substantially. Using the impact of exchange rate changes on producers' profits as an illustration, Goldberg (2004) showed that using aggregate exchange rate indexes instead of sector-specific indicators could underestimate the empirical importance of exchange rates for producers. One can, therefore, expect that the use of aggregate instead of industry-specific rates also affects the estimated incentive for producers to export.

3.2 Exports price competitiveness and macroeconomic equilibrium

For a number of countries, the previous section has established high and persistent undervaluation of the real value of the domestic currency (1991-2005); in this section, we examine whether such an undervaluation reflected or not the desire to foster manufactured exports.

Undervaluation induces a cost in term of macroeconomic equilibrium. Hence, fostering manufactured exports by adopting an undervaluation strategy means that the country deliberately accepts incurring the cost of a macroeconomic disequilibrium. In other words, in this country improving the price competitiveness of manufactured exports and maintaining macroeconomic equilibrium can not be achieved at the same time. An important question is, therefore, whether this is an issue in some of the countries under study.

To highlight the potential incompatibility between improving the price competitiveness of manufactured exports and maintaining macroeconomic equilibrium, Table 3 compares the evolution of the *EREER*, *REER* and the *ECPI* over 3 sub-periods. [3] To save on space, the Table focuses on selected countries and the three most important groups of exported manufactured products in each country. The whole results are available from the authors.

[3] Appendix C gives correlations.

Table 3: Annual growth rates (*ECPI*, *REER* and *EREER*):
Selected countries and most important manufactured products (4-digit level)

Country	Variable	1991-1995	1996-2000	2001-2005
Bolivia	*ECPI 1*	-3.02	3.46	-1.49
Bolivia	*ECPI 2*	-0.61	2.96	-7.29
Bolivia	*ECPI 3*	-1.46	5.01	-5.20
Bolivia	*REER*	-3.22	2.15	-1.87
Bolivia	*EREER*	0.71	-1.13	4.01
China	*ECPI 1*	-4.08	5.09	-2.09
China	*ECPI 2*	-4.10	4.06	-2.48
China	*ECPI 3*	-3.34	3.18	-1.93
China	*REER*	-5.31	4.46	-0.87
China	*EREER*	2.60	-2.61	1.26
Colombia	*ECPI 1*	7.83	0.49	0.36
Colombia	*ECPI 2*	4.24	1.96	-2.65
Colombia	*ECPI 3*	7.21	1.46	-0.17
Colombia	*REER*	7.28	-2.51	0.70
Colombia	*EREER*	-2.31	-0.42	2.82
Ghana	*ECPI 1*	-1.71	-2.80	-0.15
Ghana	*ECPI 2*	-4.67	-5.85	2.29
Ghana	*ECPI 3*	-6.28	-4.80	3.46
Ghana	*REER*	-5.43	-5.38	1.77
Ghana	*EREER*	0.46	2.68	-3.11
Iran	*ECPI 1*	-33.44	19.77	-20.81
Iran	*ECPI 2*	-33.84	19.47	-21.64
Iran	*ECPI 3*	-36.12	22.31	-20.88
Iran	*REER*	-35.14	23.96	-22.07
Iran	*EREER*	6.46	-3.11	-4.06
Malaysia	*ECPI 1*	-0.28	-2.94	-1.28
Malaysia	*ECPI 2*	0.79	-3.02	-1.83
Malaysia	*ECPI 3*	0.07	-2.27	-1.87
Malaysia	*REER*	-0.70	-3.78	0.12
Malaysia	*EREER*	-0.63	3.17	2.53
Tunisia	*ECPI 1*	1.99	-5.52	0.00
Tunisia	*ECPI 2*	1.97	-3.21	-0.85
Tunisia	*ECPI 3*	1.16	-5.59	-0.45
Tunisia	*REER*	1.39	-0.20	-3.81
Tunisia	*EREER*	0.83	-0.47	1.36

Note: Names of the 4-digit groups of products and weights are reported in Appendix C. *ECPI1, ECPI 2 and ECPI 3* refer respectively to the first, second and third most important groups in the country

In Table 3, the most noticeable illustration of incompatibility is Iran. The *REER* and the *ECPIs* appreciate or depreciate by almost the same amounts across the 3 periods. This is inline with high correlation coefficients (above 98%) reported in Appendix C. Moreover, such evolutions seem disconnected from the *EREER*. For instance, between 1990 and 1994 the *REER* depreciated and the *ECPI* improved while the *EREER* appreciated; the *REER* didn't follow the *EREER*. During this period 2000-2005, the *REER* depreciated much more than the *EREER* but kept on track with the *EREER*.

Although the magnitudes are lower than in Iran, China exhibits a similar pattern. Between 1990 and 1994, the *REER* depreciated and the *ECPI* improved by almost the same amount while the *EREER* appreciated; the *REER* didn't follow the *EREER*. Between 2000 and 2005, a similar picture emerged; although less pronounced. Appendix C also shows that the *REER* and the *ECPIs* are highly correlated (99%). Similar observations can be made regarding the evolution of the three variables for countries from different continents.

Overall, Table 3 suggests not only that there are instances where the objectives of manufactured exports promotion and macroeconomic equilibrium are incompatible but also that some countries seem to favor manufactured exports promotion. The results in Table 3 are, however, descriptive statistics and a more rigorous econometric analysis is needed to confirm that the *REER* is managed in order to foster the price competitiveness of manufactured exports.

The choice of the econometric approach that enables addressing our question is based on the fact that favoring the price competitiveness of manufactured exports means that the country will seek to change the *REER* in order to improve the *ECPI.* Hence, changes in the *REER* will precede changes in the *ECPI* which implies that observing the evolution of the former one can predict the evolution of the latter. In econometric terms, this means that the *REER* "Granger cause" the *ECPI*.

The seminal paper by Granger in 1969 presented a simple test of causality. Consider two stationary variables X and Y. Variable Y is causing X if one is able to better predict X using past information on Y than without using such information. Note x_t and y_t the realizations at time t of X and Y respectively (with t = 1, 2, 3, .., T). In practice, an equation is estimated where x_t is regressed on x_{t-k} and y_{t-k} (with k = 1, 2, 3, .., K). If Y causes X, the statistic pertaining to the joint significance of the coefficients of the y_{t-k} should be above the critical level.

Like for co-integration, the Granger test was for a long time conducted in a pure time series context. Now, new tests taking advantage of both the time series and the cross-section exist. Instead of observing one couple of variable (X, Y) over time, one can observe a set of couples (X_i,

Y_i) over time (with i = 1, 2, 3, .., N). Hurlin (2004) proposed a test of causality on a mix of time series and the cross-section data which is similar in spirit to Pesaran (2004) presented in Appendix B. The idea is to compute for each individual i a Wald statistic (W_i) pertaining to the joint significance discussed above. Then, calculate the average of W_i over i:

$$W_{N,T}^{Hnc} = \frac{1}{N} \sum_{i=1}^{N} W_{i}, \tag{6}$$

When N and T tend to infinity, Hurlin (2004) shows that this simple mean converges to a normal distribution. For finite N and T, the author provides critical values. In the rest of this section, we apply the causality analysis to the *REER* and the *ECPIs*.

Table 4: Results of the causality tests between the *REER* and the *ECPI*

Null hypothesis: No causality running from *REER* to *ECPI*	
All products	
Computed statistics, all countries, 1980-2005 period	1.39
Computed statistics, countries with "undervalued currencies", 1980-2005 period	0.73
Computed statistics, all countries, 1991-2005 period	1.36
Computed statistics, countries with "undervalued currencies",1991-2005 period	2.11**
Three most important products	
Computed statistics, all countries, 1980-2005 period	1.04
Computed statistics, countries with "undervalued currencies", 1980-2005 period	0.24
Computed statistics, all countries, 1991-2005 period	1.09
Computed statistics, countries with "undervalued currencies",1991-2005 period	1.84*

Note: The dependent and explanatory variables are first differences of log. Countries with "undervalued currencies" refer to countries showing undervaluation on average higher than one standard deviation in absolute term (see Table 2) over the period 1991-2005. The three most important products are those presented in Appendix C. ** = significant at 5%, * = significant at 10%

Table 4 presents the results of two sets of the causality analysis. The first set concerns the weighted average of *ECPIs* over all manufactured products while the second focuses on the weighted average of the three most important products in each country. Following the results in Section 2.3 (see Figures 1 and 2), undervaluation was especially prevalent after 1990 and especially high (above one standard deviation in absolute term) and persistent in some countries (see Table 2). Hence, each set comprises four results according to the period of observation (the 1980-2005 period versus the period 1991-2005) and to the countries included (all countries or countries with high and persistent undervaluation). The aim is to check the robustness of our conclusion. If countries use undervaluation to foster the price competitiveness of manufactured exports, causality running from changes in the *REER* to changes in the *ECPI* should exist only, or at least be stronger, with the sub-samples including countries with high and persistent undervaluation between 1991 and 2005. The results show that this is, indeed, the case independently on whether the average over all products or only over the three most important products is considered. In both cases, non-causality between changes in the *REER* to changes in the *ECPI* is rejected only for countries with high and persistent undervaluation over the period 1991 and 2005. With these sub-samples, changes in the *REER* precede changes in the *ECPI* which, in our framework, support the hypothesis that on average the concerned countries used undervaluation to foster the price competitiveness of manufactured exports over the period 1991-2005.

4. Conclusion

In search of economic growth, developing countries have been seeking the promotion of the industrialization of their economy. A majority of them relied on import substitution strategy, which turned out to be a failure. Industrialization did not occur and the productive systems suffered greatly from high trade barriers and distorted relative prices. A major policy shift then took place by the mid-1980s emphasizing trade liberalization and exchange rate management with a similar objective as before, i.e. enhancing growth by moving from primary commodity exports to manufactured exports. In this perspective exchange rate management was assigned a specific role on which this paper focused on.

Over the past decades, the literature on exchange rate management has evolved significantly. Earlier work focused on the trade dimension. In the turmoil of the eighties, exchange rate was seen as an instrument to adjust the whole economy to internal and external equilibrium. This equilibrium concept was used to shed light on the negative relation between a misalignment of the exchange rate and economic growth. This implies that countries should keep their exchange rate as close as possible to the equilibrium level. However, subsequent theoretical and empirical analyses suggest that having exchange rate departing from such equilibrium level could be a good strategy for some emerging countries. A proactive exchange rate strategy taking the form of real undervaluation of the national currency could be conductive to higher export of manufactured goods and long run growth. It follows that such countries might be obliged to choose between maintaining macroeconomic equilibrium and providing price incentive to export manufactured goods.

In this paper we have investigated whether some developing countries choose a proactive exchange rate policy in accordance with price incentives for fostering manufactured exports. The approach consists of two steps. The first one seeks to identify countries maintaining undervalued exchange rates. The second step examines whether such strategy is adopted in order to foster manufactured exports.

The results pertaining to the first step revealed a contrast between the periods before and after 1990. The period 1980-90 was characterized by exchange rate overvaluation in a large majority of countries while the period 1991-2005 exhibited exchange rate undervaluation in a large majority of countries. Overvaluation was not only more frequent in the first sub-period but also much higher than in the second. The reverse feature characterized the second sub-period with more frequent and much larger undervaluation than in the first period. This contrast fits with the fact that the 1990s have witnessed an acceleration of exchange rate reforms in many LDCs with the aim of fostering development through manufactured exports expansion. Focusing on the period 1991-2005, undervaluation was also found to be persistent and of non-negligible level (i.e. higher than one the standard deviation in absolute term) in 14 out of the 52 countries in the sample; among which China, Ghana and Algeria.

Regarding the second step, the analysis first showed that there are instances where the objectives of manufactured exports promotion and macroeconomic equilibrium are incompatible. The important question became, therefore, whether some countries favor the price competitiveness of manufactured exports over macroeconomic equilibrium. The question is addressed using the Granger-causality test in a panel data framework. The intuition underlying our test is that favoring the price competitiveness of manufactured exports means that the country will seek to set the exchange rate in order to improve such competitiveness. Hence, changes in the exchange rate will precede and explain changes in the price competitiveness which corresponds to the definition of Granger-causality. Applying the test on the whole sample and on different variants in order to check for the robustness of the conclusion, the results showed that during the "undervaluation period" (i.e. 1991-2005) the changes in the exchange rate precede changes in the price competitiveness of manufactured exports in a number of countries. In our framework, this result does not reject the hypothesis that on average the concerned countries used undervaluation to foster the price competitiveness of manufactured exports over the period 1991-2005.

Appendix A: The sample of studied countries

Africa	Latin America	Asia
Algeria	Argentina	China
Benin	Bolivia	Iran
Burkina-Faso	Brazil	Thailand
Cameroon	Columbia	Pakistan
Chad	Costa-Rica	India
Comoros	Ecuador	Philippines
Congo, Rep	Mexico	Malaysia
Cote d'Ivoire	Paraguay	Jordan
Egypt	Venezuela	Syria
Gabon	Haiti	
Gambia	Honduras	
Ghana	Panama	
Guatemala	Uruguay	
Guinea, biss	Chile	
Kenya		
Lesotho		
Madagascar		
Malawi		
Mali		
Mauritania		
Mauritius		
Morocco		
Niger		
Panama		
Rwanda		
Senegal		
Sierra-Leone		
Sri Lanka		
Swaziland		

Appendix B: Co-integration analysis and estimation of Equation 4

To present co-integration simply, consider two time series x and y that are integrated of order one; I (1). This means that their first differences (i.e. Δx and Δy) are stationary; I (0). If the regression of x on y (that are I (1)) gives a time series of residuals that is I (0), the two series are called co-integrated. This means that there exists a long-term relationship between them. The latter is given by the regression coefficients of x on y. However, the OLS estimate of the coefficient is convergent but not efficient and other estimation techniques need to be used.[4] The methodology comprises 3 major steps. First, test whether the variables are I (1). Second, test whether the variables are co-integrated. Third, estimate the long-term relationship.

First developed in a "pure" time series context, co-integration analysis has been subsequently extended to data combining both the time series and the cross-section (commonly referred to as panel data) dimensions. The 3 steps for the analysis are the same as above except that the nature of the data (i.e. time series and the cross-section) involves a preliminary check regarding whether individuals (e.g. countries) are interdependent or not. This is important for the tests to be used in the co-integration analysis. This Appendix applies the panel-data-co-integration analysis to Equation 2.

To examine whether individuals are interdependent, we use a test suggested by Pesaran (2004). The test is based on the average of the correlations between the residuals from a regression on each individual separately. Practically, consider the variable y_i pertaining to the individual i. The variable is regressed on its first lag and the residuals are collected to compute ρ_{ij} which is the correlation coefficient between the residuals from individual i and j regressions. The statistics:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \qquad \text{(B.1)}$$

is shown to have a N (0, 1) distribution under the null hypothesis of independence. Where N is the number of individuals and T is the number of years.

The results of the test applied to our sample are presented in Table B.1. For all variables, the test rejects the null hypothesis of independence of individuals at the 1% level.

[4] There are other approaches to test for co-integration (e.g. Johansen and Juselius, 1990). It is not the aim of the paper to discuss them.

Table B.1. Tests of the independence of the variables across individuals

Variables	Calculated statistics
Cap	7.28***
Open	16.06***
rDebt	6.48***
Gov	3.34***
ToT	2.43***
REER	14.32***
GDPgap	12.04***
BalSam	10.09***

Note: *** = significant at 1%

B.1 Stationarity tests

To examine stationarity, we should, therefore, use a test that incorporates the interdependence of individuals. Among the existing test, the one by Pesaran (2005) is the most adequate because it is targeted toward a situation where N (the number of individuals) is higher than T (the number of years). In addition, the test allows analyzing non-stationarity within a heterogeneous panel framework, i.e. a panel in which each country is allowed to evolve according to its own dynamics. The test builds on the well-known augmented Dickey-Fuller regressions. Practically, consider y_{it} pertaining to the individual i at time t. Run the regression:

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \gamma_i \bar{y}_{t-1} + \delta_i \Delta \bar{y}_t + \vartheta_{it} \qquad \text{(B.2)}$$

and take the calculated Student statistics of ρ_i ; t_i. Where $\hat{y}_t$ is the average of y_{it} over all individuals at time t. The statistics:

$$CIPS\ (N,T) = \frac{1}{N} \sum_{i=1}^{N} t_i\ (N,T) \qquad \text{(B.3)}$$

is used to test for stationarity but it does not have a standard distribution. We follow Pesaran (2005) and simulate the critical values using the Monte Carlo approach. If the computed statistics (*CIPS*) is above the critical value, one cannot reject the null hypothesis of stationarity.

Table B.2. Test of the stationarity of the variables

Variable	Stationarity in	
	Level	First difference
Cap	-2.01	-5.78***
Open	-2.06	-4.89***
rDebt	-1.75	-5.24***
Gov	-1.80	-4.55***
ToT	-1.93	-5.33***
REER	-1.98	-4.65***
GDPgap	-2.09	-4.03***
BalSam	-1.92	-4.15***

Note: *** = significant at 1%

Table B.2 presents the results. The tests reveal that all variable are I (1). Hence, if we find a relationship among the variables which gives stationary residuals, these variables will be considered as co-integrated.

B.2 Co-integration tests

The best-known tests are due to Pedroni (1995, 2004). They allow taking account of heterogeneity among individuals. The author proposed 7 versions of the co-integration test: 4 are suitable when studying the relationship of the variables within countries and 3 pertain to the relationship between variables of different countries. The former set of tests is the most suitable for our study. The procedure is the following. Consider a dependent variable y_{it} and set of explanatory variables x_{kit} observed for individual i at time t. To conduct the test, proceed in the 5 following steps:

1. Estimate the following co-integration regression over the panel:

$$y_{it} = \alpha_i + \delta_i t + \beta_{1t} x_{1it} + \beta_{2t} x_{2it} + \cdots + \beta_{kt} x_{Kit} + \varepsilon_{it}$$

2. Differentiate the original series for each member, and estimate the following regression over the panel:

$$\Delta y_{it} = b_{li} \Delta x_{1it} + \cdots + b_{Ki} \Delta x_{Kit} + \eta_{it}$$

3. Calculate L^2_{11i} as the long-run variance of η_{it} using, for instance, the Newey and West (1987) estimator.

4. Apply a DF and ADF regressions to the residuals ε_{it} and compute the long-run (σ_i^2) and the simple variances (s_i^2) from of the residuals of the DF regression as well as the simple variances (s_i^{*2}) from of the residuals of the ADF regression.

5. Using the above parameters, the following four statistics can be computed to test for co-integration:

Panel *v*- statistic:

$$T^2 N^{3/2} Z_{vN,T} \cong T^2 N^{\frac{3}{2}} (\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2}\, \hat{\varepsilon}_{i,t-1}^{2})^{-1}$$

Panel ρ- statistic:

$$T\sqrt{N} Z_{\hat{\rho}N,T^{-1}} \cong T\sqrt{N}\left(\sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2}\, \hat{\varepsilon}_{i,t-1}^{2}\right)^{-1} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2} \left(\hat{\varepsilon}_{i,t-1}\Delta\hat{\varepsilon}_{i,t} - \hat{\lambda}_i\right)$$

Panel t- statistic:

$$Z_{tN,T} \cong \left(\tilde{\sigma}_{N,T}^{2} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2}\, \hat{\varepsilon}_{i,t-1}^{2}\right)^{-\frac{1}{2}} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2} \left(\hat{\varepsilon}_{i,t-1}\Delta\hat{\varepsilon}_{i,t} - \hat{\lambda}_i\right)$$

Panel ADF statistic:

$$Z^{*}{}_{tN,T} \cong \left(\tilde{s}_{N,T}^{*2} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2}\, \hat{\varepsilon}_{i,t-1}^{*2}\right)^{-\frac{1}{2}} \sum_{i=1}^{N}\sum_{t=1}^{T} \hat{L}_{1li}^{-2} \left(\hat{\varepsilon}^{*}{}_{i,t-1}\Delta\hat{\varepsilon}^{*}{}_{i,t} - \hat{\lambda}_i\right)$$

where $\lambda_i = 0.5\ (\sigma_i^2 - s_i^2)$

Pedroni (1995, 1997) showed that, with a slight correction, the statistics converge toward a normal distribution. Actually:

$$\frac{x_{NT} - \mu\sqrt{N}}{\sqrt{\nu}} \backsim N(0,1)$$

where x_{NT} is one of the 4 statistics and μ and v are tabulated by Pedroni (1999). The results of the co-integration tests applied to Equation 2 are presented in Table B.3. Two tests suggest that the variables are co-integrated but two others suggest the reverse. We follow Pedroni (2004) who being faced with the same type of results concluded that the variables are co-integrated (See also Barisone et al., 2006).

Table B.3. Test of co-integration

Statistics	Calculated value
Panel *v*- statistic	-3.18***
Panel ρ- statistic	4.37***
Panel t- statistic	-1.10
Panel ADF statistic	0.28

Note: *** = significant at 1%

B.3 Estimation of the coefficients

Although the variables are co-integrated, the OLS estimate of the parameters is convergent but not efficient (Kao, Chiang and Chen 1999). Two methods are available to get efficient estimate of the parameters. One, labeled dynamic OLS (DOLS), was developed by Kao and Chiang (1998) and consists of adding to the co-integration equation lags of the explanatory variables in order to "clean" the error term from any autocorrelation and heteroskedasticity. The other, called Fully Modified OLS (FMOLS), was proposed by Pedroni (2000). It is little bit more complicated to explain in a non-technical way. Roughly explained, it consists in running an OLS estimate of the co-integration equation and using the residuals to compute their variance-covariance matrix. This is, then, used to perform a "sort of GLS" on the co-integration equation. Both methods were applied to Equation 2 and the results are presented in Table B.4. The overall quality of fit is good. Except for the variable Cap, the sign, level and significance of the coefficients are broadly similar. In the text, we will focus on the DOLS results.

Table B.4. Estimation results of Equation (2)

Variables	Estimation methods	
	DOLS	FMOLS
Cap	0.00***	0.00
	(4.02)	(0.25)
Open	-0.52***	-0.55***
	(14.01)	(7.48)
BalSam	0.38***	0.34***
	(7.90)	(6.64)
rDebt	-0.11***	-0.05***
	(6.11)	(3.12)
Gov	0.25***	0.17***
	(6.25)	(11.67)
ToT	0.12***	0.10***
	(3.31)	(6.83)
GDPgap	-0.01*	-0.01**
	(1.75)	(2.45)
A-R^2	0.60	0.57

Note: Absolute t-statistics are in parentheses. *** = significant at 1%, * = significant at 10%

Appendix C: Correlations between the *REER* and the *ECPI*

(Most important 4-digit groups of products, by country)

Country	4 digit groups of products	Weight in exports (%)	Correlation	Country	4 digit groups of products	Weight in exports (%)	Correlation
Argentina	Oil-cake,oilseed residue	14.51	0.997	Lesotho	Trousers,breeches,etc.	26.68	0.284
Argentina	Oth.wheat,meslin,unmlled	7.07	0.988	Lesotho	Shirts	13.21	0.370
Argentina	Maize, other unmilled	5.56	0.973	Lesotho	Oth.footwear,textle uppr	7.34	0.336
Benin	Edible nuts fresh,dried	8.16	0.723	Madagascar	Spices,ex.pepper,pimento	28.51	0.927
Benin	Meat,edible offal, nes	4.45	0.947	Madagascar	Crustaceans, frozen	16.59	0.954
Benin	Oil-cake,oilseed residue	1.59	0.789	Madagascar	Jersys,pullovrs,etc.knit	11.26	0.985
Bolivia	Oil-cake,oilseed residue	14.29	0.990	Malawi	Trousers, bib & brace etc	11.33	0.878
Bolivia	Aircrft etc.ULW >15000kg	6.79	0.919	Malawi	Shirts	9.37	0.930
Bolivia	Tin,tin alloys,unwrought	4.65	0.700	Malawi	Blouses,shirt-blouse,etc	2.55	0.830
Brazil	Aircrft,ULW 2001-15000kg	6.43	0.903	Malaysia	Electronic microcircuits	22.08	0.997
Brazil	Oil-cake,oilseed residue	5.63	0.896	Malaysia	Parts,data proc. etc.mch	15.01	0.989
Brazil	Pass.transport vehicles	5.34	0.943	Malaysia	Storage units,data proc.	4.19	0.988
Burkina Faso	Cotton yarn,excl. thread	1.82	0.553	Mali	Sheep,lamb skin leather	1.25	0.971
Burkina Faso	Sheep,lamb skin leather	1.73	0.969	Mali	Goat or kid skin leather	0.32	0.744
Burkina Faso	Goat or kid skin leather	1.03	0.659	Mali	Printed matter, nes	0.32	0.982
Cameroon	Cocoa beans	7.96	0.255	Mauritius	T-shirts,othr.vests knit	23.77	0.255
Cameroon	Alum.,alum.alloy,unwrght	4.59	0.917	Mauritius	Shirts	21.15	0.175
Cameroon	Coffee, not roasted	4.16	0.860	Mauritius	Trousers,breeches,etc.	10.57	0.072
Chile	Copper;anodes;alloys	33.31	0.892	Mexico	Pass.transport vehicles	15.95	0.862
Chile	Grapes, fresh or dried	4.10	0.873	Mexico	Insultd wire,etc.condctr	6.97	0.923
Chile	Fish,frozen ex.fillets	3.35	0.291	Mexico	Colour televisn receiver	6.85	0.903
China	Parts,data proc. etc.mch	10.18	0.998	Morocco	Inorganic acid,oxide etc	8.65	0.640
China	Input or output units	8.99	0.995	Morocco	Diodes,transistors etc.	7.93	0.734
China	Parts,telecommun. equipt	7.80	0.998	Morocco	Molluscs	7.67	0.475
Colombia	Coffee, not roasted	10.32	0.914	Niger	Oth.frsh,chll.vegetables	10.54	0.995
Colombia	Bananas, fresh or dried	5.00	0.919	Niger	Oth85%+cottn.fabric<200g	2.78	0.982
Colombia	Other ferro-alloys	2.78	0.818	Niger	Fish salted or in brine	1.18	0.992
Comoros	Spices,ex.pepper,pimento	91.08	0.475	Pakistan	Household linens	16.26	0.917
Comoros	Essential oils	5.21	0.803	Pakistan	Cotton yarn,excl. thread	13.60	0.888
Comoros	Air conditioning mch,pts	0.50	0.760	Pakistan	Rice,milled,semi-milled	7.15	0.989

Costa Rica	Parts,data proc. etc.mch	34.93	0.811	Panama	Bananas, fresh or dried	19.86	0.774
Costa Rica	Bananas, fresh or dried	13.37	0.435	Panama	Fish,frozen ex.fillets	10.58	0.497
Costa Rica	Othr.medical instruments	6.64	0.876	Panama	Crustaceans, frozen	10.57	0.144
Ecuador	Bananas, fresh or dried	22.46	0.976	Paraguay	Oil-cake,oilseed residue	9.30	0.997
Ecuador	Crustaceans, frozen	8.10	0.865	Paraguay	Bovine meat,frsh,chilled	5.24	0.941
Ecuador	Fish,prepard,presrvd,nes	6.91	0.949	Paraguay	Maize, other unmilled	3.95	0.948
Egypt	Cotton yarn,excl. thread	3.33	0.901	Philippines	Electronic microcircuits	41.16	0.992
Egypt	Rice,milled,semi-milled	3.14	0.936	Philippines	Parts,data proc. etc.mch	8.26	0.926
Egypt	Household linens	2.92	0.956	Philippines	Input or output units	7.19	0.844
Gabon	Veneer,plywood sheets	0.89	0.969	Rwanda	Fabrc<85%syn.stp.fbr+ctn	36.27	0.835
Gabon	Plywood,solely of wood	0.64	0.662	Rwanda	Metal fencing,gauze etc.	27.23	0.861
Gabon	Helicopters	0.63	0.974	Rwanda	Batteries,accumulators	0.78	0.720
Gambia	Fish,frozen ex.fillets	8.39	0.991	Senegal	Inorganic acid,oxide etc	19.11	0.974
Gambia	Crustaceans, frozen	8.06	0.654	Senegal	Crustaceans, frozen	7.62	0.643
Gambia	Soap	5.87	0.987	Senegal	Oil-cake,oilseed residue	5.65	0.904
Ghana	Cocoa beans	23.16	0.998	Sri Lanka	Spices,ex.pepper,pimento	18.25	0.664
Ghana	Alum.,alum.alloy,unwrght	7.96	0.999	Sri Lanka	Trousers, breeches etc.	6.15	0.559
Ghana	Fish,prepard,presrvd,nes	4.41	1.000	Sri Lanka	Trousers,breeches,etc.	5.69	0.631
Guatemala	Coffee, not roasted	22.84	0.705	Swaziland	Flavours,industrial use	36.69	0.345
Guatemala	Sugars,beet or cane, raw	11.83	0.628	Swaziland	Food preparations, nes	10.72	0.255
Guatemala	Bananas, fresh or dried	11.39	0.703	Swaziland	Sugars,beet or cane	9.64	0.500
Honduras	Coffee, not roasted	18.70	0.907	Syria A. R.	Cotton yarn,excl. thread	1.75	-0.249
Honduras	Fruit,fresh,dried, nes	10.68	0.840	Syria A. R.	Durum wheat, unmilled	1.75	-0.221
Honduras	Bananas, fresh or dried	10.08	0.889	Syria A. R.	Tomatoes,fresh,chilled	1.57	-0.198
India	Diamonds.excl.industrial	30.12	0.971	Thailand	Parts,data proc. etc.mch	15.76	0.972
India	Cotton yarn,excl. thread	5.69	0.900	Thailand	Electronic microcircuits	9.85	0.991
India	Gold,silver jewelry,ware	5.06	0.996	Thailand	Rice,milled,semi-milled	4.90	0.200
Iran	Carpets etc.knotted	2.44	0.980	Tunisia	Trousers,breeches,etc.	13.93	0.444
Iran	Edible nuts fresh,dried	1.82	0.996	Tunisia	Oth.garments,not knitted	8.79	0.389
Iran	Cyclic hydrocarbons	0.42	0.999	Tunisia	Insultd wire,etc.condctr	6.76	0.723
Jordan	Medicaments, nes	11.07	0.980	Uruguay	Oth.bovine,equine leathr	12.88	0.873
Jordan	Shirts	6.30	0.732	Uruguay	Bovine meat, frozen	12.59	0.787
Jordan	Nitrogenous chem.fertlzr	6.00	0.947	Uruguay	Rice,milled,semi-milled	7.15	0.654
Kenya	Tea	32.57	0.599	Venezuela	Alum.,alum.alloy,unwrght	2.61	0.963
Kenya	Coffee, not roasted	9.42	0.708	Venezuela	Pellets,etc.pig iron,etc	1.10	0.982
Kenya	Oth.frsh,chll.vegetables	7.89	0.893	Venezuela	Flat,cold-rolld,prod.irn	0.68	0.985

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